The efficacy and feasibility of incorporating a standing workstation for perceived low back pain and disability, among call centre workers: a pilot single case study.

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April 2019

DECLARATION

By submitting this thesis electronically, I declare that the entirety of the work contained therein is my own, original work, that I am the sole author thereof (save to the extent explicitly otherwise stated), that reproduction and publication thereof by Stellenbosch University will not infringe any third-party rights and that I have not previously in its entirety or in part submitted it for obtaining any qualification.

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ABSTRACT

Introduction

Despite evidence supporting the use of standing workstations in offices the effect of standing in a call centre on work-related low back pain (WR-LBP) is unknown. It is also not known if it is feasible to introduce standing workstations into call centres. The aim of this pilot study was to ascertain the efficacy of a standing workstation on WR-LBP and related disability amongst call centre workers and to further explore the feasibility of a standing workstation in a call centre environment.

Methods

The study was conducted at a national corporate call centre in South Africa. The study incorporated an n=1 (A-B-A-B) single case study design. Ethical approval was obtained from Stellenbosch University's Health Research Ethics committee (Reference: S17/04/083). Approval to conduct the study at the selected company was obtained from management. Invitations to participate in the study was done internally by management, and a potential candidate was screened and recruited by the researchers. One call centre agent, his direct manager and five of his surrounding colleagues were invited to participate in the study. Written informed consent was obtained from all participants prior to commencement of the study. Data collection was done over five weeks, i.e. alternating weeks of sitting and standing with a one-week accommodation period. The participant's company-issued workstation was swopped during the standing weeks to accommodate the standing workstation. The participant was asked to complete the Numeric Pain Rating Scale (NPRS) and Oswestry Disability Index (ODI) questionnaires relating to his back pain and symptoms over the past week.

Specifically designed open- and closed ended questionnaires for the participant, colleagues and the participant's manager was used to collect data regarding the feasibility of implementing standing workstations in a call centre.

Results

Prior to data capturing the participant spent his workday seated. During testing the participant spent 66% of the workday standing. The rest of the time was spent perch sitting, i.e. half-sitting. In the sitting weeks an increase in ODI and NPRS scores were noted indicative of discomfort due to the inability to change posture. In the standing weeks a decrease in these scores were noted. The standing posture thus appears to have had a positive effect on the participant's overall disability.

Conclusion

In conclusion, though the study design may have been lacking rigour it served as a good vehicle to explore the efficacy and feasibility of introducing a standing workstation into traditional call centres. Though the findings cannot be generalised to all call centres it does provide insight to the daily work-life of a call centre agent and how the change of a workstation affected his daily routine. The findings showed a reduction in disability and WR-LBP in a call centre agent as well as a reduction in sedentary time and adoption of standing as a viable work posture. Furthermore, it provided positive feedback on the feasibility of standing workstations in call centres. Further research should focus on larger samples and a wider population and perhaps on different workstation setups as well as other musculoskeletal disorders.

OPSOMMING

Inleiding

Ten spyte van bewyse wat die gebruik van staande werkstasies aanbeveel is die effek daarvan in inbelsentrums op werkverwante rugpyn nog onbekend. Dis ook nie bekend of dit haalbaar is om 'n staande werkstasie in 'n tradisionele inbelsentrum te gebruik nie. Die doel van hierdie loods-studie is om die doeltreffendheid van 'n staande werkstasie op rugpyn onder inbelsentrumwerkers te verken en om te bepaal of dit haalbaar is om 'n staande werkstasie in 'n inbelsentrum te inkorporeer.

Metode

Die studie is gedoen by ‘n digbevolkte korporatiewe inbelsentrum in Kaapstad, Suid-Afrika. Die studie volg 'n n = 1 (A-B-A-B) enkel gevallestudie ontwerp. Etiese goedkeuring om die studie te doen is van die Universiteit Stellenbosch se gesondheid navorsing etiese komitee (Verwysing**:** S17/04/083) asook by die geselekteerde maatskappy verkry. Deelnemers is intern verwerf deur maatskappybestuur. Die toepaslike deelnemers was deur die navorsers verwerf. Die studie deelnemer, sy onmiddelike kollegas en hul bestuurder was gevra om deel te neem aan die studie. Ingeligte toestemming is van alle deelnemers voor aanvang van die studie verkry. Dataversameling was gedoen oor 'n tydperk van vyf weke. Die tradisionele werkstasie was verruil tydens die staande weke om die sit-staan lessenaar, *wobble* stoel en 'n staanmat te akkommodeer. Die deelnemer is gevra om die *Numeric Pain Rating Scale (NPRS)* en *Oswestry Disability Index (ODI)* vraelyste met betrekking tot sy rugpyn en simptome oor die afgelope week te voltooi. Spesifiek-ontwerpte vraelyste vir die deelnemer, kollegas en die deelnemer se span leier is gebruik om data oor die haalbaarheid van implementering van sit-staan werkstasies in 'n inbelsentrum te versamel.

Resultate

Voor data insameling het die deelnemer heeldag gesit by sy lessenaar. Gedurende data insameling het hy 66% van die tyd gestaan en werk en die res van die tyd ge-halfsit op die *wobble* stoel. ‘n Toename in ODI en NPRS was opgemerk tydens die sit-weke wat moontlik daarop dui dat die deelnemer ongemaklik was in die sitpostuur. In die staan-weke het ons die teenoorgestelde opgemerk. Dit wil dus voorkom dat die staanpostuur gelei het tot ‘n afname in die deelnemer se ongeskiktheid.

Gevolgtrekking

Ter opsomming, hoewel die studie ontwerp dalk afgeskeep het het dit gedien as ‘n toepaslike voertuig om vas te stel of dit haalbaar is om ‘n staande werkstasie in ‘n inbelsentrum te gebruik asook die effektiwiteit daarvan. Alhoewel die bevindinge van hierdie studie nie veralgemeen kan word nie het dit insig gebied tot die werking van ‘n inbelsentrum, die werker se roetine en hoe dit beinvloed word deur ‘n staande werkstasie. Tenspyte van die tekortkominge van die studie ontwerp het die studie bevindinge ‘n afname in ongeskiktheid van laer rugpyn en sittende tyd getoon in die deelnemer. Dit wil ook voorkom asof die deelnemer die staanpostuur goed aangeneem het as ‘n alternatiewe werkpostuur. Die studie bevindinge dui ook op positiewe terugvoer aangaande die gebruik van staande werkstasies in inbelsentrums. ‘n Aanbeveling vir toekomstige navorsing is om te fokus op ‘n weier studiegroep en dalk op verskillende tipes werkstasies en/of muskuloskeletale pyn populasies.

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LIST OF ABBREVIATIONS

Low back pain (LBP)

Musculoskeletal (MS)

Musculoskeletal disorders (MSDs)

Numeric Pain Rating Scale (NPRS)

Oswestry Disability Index (ODI)

Work Related Musculoskeletal Disorders (WMSDs)

CHAPTER 1

1. Introduction

Background

In the modern society, many adult employees in developed and developing countries alike spend their working lives in an office environment (1-3) Due to economic demands and advances in technology (1), office environments have become increasingly sedentary in nature (2). Office workers can now conduct almost all work-related tasks from behind their computers and therefore do not have to leave their desks at all during a workday (3). With most corporates adopting office tables and chairs as their workstations of choice for computer users, employees inadvertently spend their workday seated in static and awkward postures for extended periods of time (4). Literature shows that office workers spend more than 80% (1,2) of the traditional 9am to 5pm working day seated. High sitting time is associated with musculoskeletal (MS) pain (4), has been linked to an increased risk of obesity (2), depression, musculoskeletal disorders (MSDs) such as low back pain (LBP) (2), the hand and wrist, neck, upper back (1,4) and premature mortality. In other words, prolonged sitting predisposes office workers to discomfort and pain (1) and is thus a potential risk to health and safety for employees and employers alike (5).

Among all the office workers, call centre workers are the most deskbound and have the least physical activity during the workday (5). For call centre agents, the daily routine is unremitting and forces them to work in sedentary postures for long hours (8) behind their static workstations doing repetitive tasks and movements which could lead to the development and/or exacerbation of MSDs (6). Currently, the office environment for call centre workers does not allow employees to get up and walk around freely.

Also, due to the nature of the call centre environment, employee autonomy is weakened leaving call centre workers often pushed to reach daily targets in an intensely stressful environment with high productivity demands (9). This inactivity poses a physical risk on the MS system (e.g. passive loading on the spine, excessive and/or sustained forces, static loading) (7) as tissues are not being challenged when they are immobile. Over time, this causes a decrease in the tolerance of the tissue to handle external loading. Insufficient rest of the MS system may cause micro-damage to ligaments and lead to the risk of developing neuromuscular disorders. As a result, call centre workers typically suffer from back, neck and upper limb pain (9).

Previous research suggests that by using a standing desk at work an employee could reduce time spent sitting to between 30 min/day and 120 min/day (8). It is recommended that call centre workers intermittently change between sitting and standing at work throughout the day to decrease the negative health effects of prolonged sitting (6). One way of achieving this is to introduce sit-stand desks into the workplace to reduce sitting time (9). Some of the positive psychological effects reported are that standing allowed for a steadier work performance, and that it may lead to decreased work stress, discomfort and psychological strain as workers can change their posture throughout the working day instantly at onset of discomfort (12). This in turn could lead to increased productivity and energy levels, better work satisfaction, and quality of life and subsequently more motivation for increasing physical activity in their leisure time (12).

However, what has not quite been explored is whether it is feasible to implement sit-stand desks in a call centre environment. The potential benefits of sit-stand desks may have been reported, but if it is not practical for an intervention to be implemented in a specific setting, then the effects of that intervention are of no relevance.

For this reason, the researcher decided to explore this gap in the research. The researcher initially set out to have a few different standing workstation set-ups, but due to company constraints and the lack of funding and/or sponsorships for equipment this was not possible. However, without compromising on having a real-life situation and without disrupting the participant and team, the only viable option was to do a single case study in a functioning departmental call centre team setup which included the call centre agent, immediate colleagues and his manager.

Despite the scepticism about using case studies in research methodology, they may offer valuable insights that might not be achieved with other forms of research (13,14). And since case studies are typically used within business environments to minimise disruption and capture real-life situations, at the time it was believed to be the most appropriate method for this study (11). Case studies can be viewed as a useful tool for the preliminary, exploratory stage of a research project as they are useful in answering the 'How' and 'Why' questions (12) before embarking on expensive and large studies. Case studies, in their true essence, explore and investigate contemporary real-life phenomenon through detailed contextual analysis of a limited number of events or conditions, and their relationships. In other words, a case study is a unique way of observing any natural phenomenon which exists in a set of data (10). It allows practitioners and researchers an opportunity to look at the world around us and to formulate questions perhaps not yet known, i.e. the purpose of the research is yet to be defined (12). Furthermore, constraints to selecting case study as a research method include accessibility, resources, and time available (12); and in the current study, resources and time were constraints. The researcher could only secure one set of equipment from the sponsor and just for a limited time frame. Time was also a big factor as the researcher was at the mercy of the company's time schedules. The researchers approached several companies and had to wait for responses from them leaving just enough time to implement the experiment.

Based on the above reasons, the researcher set out to conduct a pilot study exploring the efficacy of a complete standing workstation on perceived work-related LBP and related disability amongst call centre workers and to further explore the feasibility of incorporating a standing workstation in a traditional call centre environment using a single case study. Call centre workers are particularly of interest in this study since many companies in South Africa utilize call centres, yet do not address the issues of typical MSDs and other health concerns which arise due to the nature of call centre work.

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CHAPTER 2

The following chapter is presented as an article formatted in preparation for submission for publication in the BMC Pilot and Feasibility Studies Journal.

The efficacy and feasibility of incorporating a standing workstation for perceived low back pain and disability, among call centre workers: a pilot single case study.

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ABSTRACT

Background

Despite evidence supporting the use of standing workstations, the effect thereof in a call centre on work-related low back pain (WR-LBP) and related disability is unknown. It is also unknown if it is feasible to introduce a standing workstation into a call centre. The aim of the following pilot study is to explore the efficacy of a standing workstation on WR-LBP and related disability amongst call centre workers and to further explore the feasibility of incorporating a standing workstation in a call centre.

Method

An n=1 (A-B-A-B) single-case study was conducted at a call centre in South Africa. Ethical approval was obtained from Stellenbosch University's Health Research Ethics committee and the company's management. Informed consent was obtained from all participants. Data collection was done over 5 weeks. The participant's workstation was replaced during the standing weeks with a sit-stand desk, wobble stool and standing mat. The Numeric Pain Rating Scale (NPRS) and Oswestry Disability Index (ODI) outcome measures were used to gather information relating to back pain and disability. Specifically-designed questionnaires for all participants were used to collect data regarding the feasibility of standing workstations in the call centre.

Results

Results showed that the participant spent 66% of the workday standing during data capturing. Sitting time was reduced and it correlated with a reduction in ODI and NPRS in the standing weeks. In the sitting weeks the opposite was noted. The standing posture appears to have had a positive effect on the participant's disability. The study also provided positive feedback on the feasibility of standing workstations in call centres.

Conclusion

In conclusion, this pilot study served as a good vehicle to explore the efficacy and feasibility of a standing workstation in a call centre. Though the findings cannot be generalised it provides insight to the work-life of a call centre agent and how the change of a workstation affected his daily routine. Despite its shortcomings, the study findings showed a reduction in disability due to LBP and a reduction in sitting time in a call centre agent. Further research should focus on larger samples.

Keywords: *standing workstation, call centre, ergonomics, low back pain, sit-stand desk, feasibility, South Africa*

BACKGROUND

Today, office workers can conduct almost all work-related tasks from behind their computers and therefore do not have to leave their desks at all during a workday (1). The workplace of an office worker has therefore become more efficient but also more sedentary as they are known to sit significantly more during the working day (1). In the USA it was found that the average person above the age of six years spends at least 7.7 hrs/day in a sedentary posture (2). Sedentary behaviour is defined as “any wakeful activity expending 1.5 metabolic equivalents (METs) in a reclining or sitting position” (3).

For call centre agents, the daily routine is unremitting and forces them to work in sedentary postures for long hours (4) behind their static workstations doing repetitive tasks and movements (5). It has been proven that awkward postures for prolonged periods at work could result in discomfort and/or pain and chronic fatigue(4). It has also been noted that the severity of discomfort or pain from long periods of static postures correlated negatively to focus and concentration (4). Thus, with increased discomfort comes decreased focus and vice versa which could eventually result in loss of productivity (4). Furthermore, due to the nature of the environment in call centres, employee autonomy is weakened, and call centre workers are often pushed to reach daily targets in an intensely stressful environment with high productivity demands (5) that frequently results in employee burn-out (6). In addition, this leads to increased work-related stress which has been associated with work-related musculoskeletal disorders (WMSDs) (6,7).

A 2005 United Kingdom study on 2000 employees corroborates this with their findings that WMSDs are very common among office workers (5). According to Sprigg et al.(5) up to 2 thirds of the participants suffered from neck, back and upper limb pain. This is in keeping with the findings of Odebiyi et al. (8) that reported a 12-month prevalence of WMSDs among call centre

workers to be as high as 93.2% with WMSDs mainly affecting the back, neck, shoulders and arms. The most frequent WMSD reported by the call centre workers was found to be LBP (reported as an annual prevalence of 35%) with the discomfort caused by the LBP often preventing call centre workers from doing their daily work (6,8).

It is therefore recommended that the office worker intermittently change between sitting and standing at work throughout the day to decrease the negative health effects of prolonged sitting (1). Among other negative health effects, a correlation between sedentary behaviour and brain health may also exist (9). It is thus important for the benefit of overall health to lessen time spent in sedentary activities to combat negative health effects. Previous research suggests that by using a standing desk at work an employee could reduce time spent sitting by 30 to 120 min/day (10). One way of achieving this is to introduce a standing workstation into the workplace with the intention of reducing sitting time and encouraging alterations in work positions during the workday thereby improving overall health (11). Some of the positive psychological effects reported are that standing allowed for a steadier work performance, and that it may lead to decreased work stress, discomfort and psychological strain as workers can change their posture throughout the working day instantly at onset of discomfort (11). This in turn could lead to increased productivity and energy levels, better work satisfaction, and quality of life and subsequently more motivation for increasing physical activity in their leisure time (11). This is particularly important for call centre workers who spend most of their working day in a sedentary position.

Other positive outcomes reported are that regular use of a standing desk at work had positive effects on physiological and psychological outcomes (11). More specifically, it was noted that using a standing desk at work lead to increased energy expenditure and essentially weight loss (11).

The use of a standing desk at work may therefore be useful to maintain energy balance throughout the day and it could be a weight management tool for both the obese and non-obese (11). In addition, Subbarayalu (6) found that 65% of female Indian call centre workers experienced anxiety with 52% developing depression. These figures were lower for males at 34% and 23% respectively. More than 50% of all workers reported suffering from sleep deprivation which could be a sign of fatigue and occupational burn-out. These findings were unique to call centre workers and are also linked to physical health issues, e.g. MSDs. Interventions to reduce anxiety and depression among this population are also therefore required (6).

Despite the evidence supporting the use of standing workstations, and the popularity among individual office workers and trendier companies, the effect of standing in a call centre on perceived work-related LBP and related disability is unknown. It is also not known if it is feasible to introduce a standing workstation into a traditional call centre environment.

The primary aim of this pilot study is therefore to explore the efficacy of a complete standing workstation (sit-stand desk, anti-fatigue standing mat and a wobble stool) on perceived work-related LBP and related disability for a call centre worker. The secondary aim of the study is to explore the feasibility of incorporating such a workstation in a call centre environment. Call centre workers are of particular interest in this study since many companies in South Africa utilize call centres, yet do not address the issues of typical MSDs and other health concerns which arise due to the nature of call centre work.

In the current study standing is defined as complete unaided standing. Sitting is defined as complete sitting in a chair with full postural support. Perch sitting is defined as half-sitting on a wobble stool for postural support.

The objectives of the study are to: determine the efficacy of a standing workstation on perceived work-related LBP and related disability experienced by call centre workers; establish the feasibility of incorporating a standing workstation in a call centre environment based on company policy, workspace logistics and level of disruption; establish the feasibility of incorporating a standing workstation in a call centre environment based on manager, colleague and user's feedback; establish the feasibility of incorporating a standing workstation in a call centre environment based on ease of use/ease of operating during work activities; establish the feasibility of incorporating a standing workstation in a call centre environment based on ease of shifting between sitting and standing positions; determine how often during the day the call centre agent changes positions from sitting to standing.

2. Methods

2.1 Sample inclusion and exclusion criteria

The following inclusion criteria was applied in this study: 1) male or female call centre agent working at a Cape Town based call centre; 2) between 20 and 40 years of age—an attempt to lessen the impact of natural degeneration; 3) employed for a continuous period of at least one full year in the call centre; 4) experienced perceived work-related LBP; 5) works for a minimum of 8 hours/day and 6) sits for a minimum of 6 hours during the working day.

Participants who have had 1) any previous orthopaedic surgery of the spine, arms and/or hands, legs and/or feet; 2) any chronic conditions affecting the MS or Neurological systems; 3) used any mood enhancing/stabilising agents – prescribed by a medical practitioner or

otherwise; 4) pregnant females or 5) diagnosed and documented depression or any other psychological condition, were excluded.

2.2 Sampling recruitment method

Permission was sought to conduct the study from the relevant management structures at a Cape Town based call centre (Appendix 1). Thereafter an email invitation detailing the proposed study was sent to all call centre agents via internal company email. The employees were allowed two weeks to respond on advice from the manager who informed the researcher that this is enough time to get a response based on previous experience. The call centre agents were asked to reply if they were interested in taking part in the study. A second email was sent to all interested call centre agents and they were asked to complete a screening questionnaire (Appendix 2). Based on their responses to the screening questionnaire, suitable candidates were shortlisted accordingly. Following the email campaign sent out by the manager fifteen employees responded. Out of the fifteen employees, only two met all the inclusion criteria.

The two candidates were further screened by the principle investigator in the order the responses were received. The first candidate who consented to be tested was then recruited to be the study participant (Appendix 3a).

The same procedure was followed to get consent from the study participant's colleagues (participants B) and the team leader (participant C) (Appendix 3b and c). The principle investigator met with all the participants in person to explain the details of the study and to get the necessary informed consent.

2.3 Profile of participant

The participant was a 21-year-old male, 1.68m tall and weighing 64kg. The participant had self-reported work-related LBP and discomfort during his workday after he started working as a call centre agent.

He complained of pain and numbness in the lower back region as well as occasional neck and upper back stiffness. The participant has been working in the call centre environment for approximately three years of which the last year was at the call centre in question.

2.4 Description of the call centre

The study was conducted at a high-paced national corporate call centre situated in Cape Town, South Africa. The call centre environment was a very densely populated department. It is an open-plan design with approximately 500 workers seated at a desk. Call centre agents have strict scheduled breaks that must be adhered to ensure that calls are answered and resolved timeously throughout the day. Teams consisted of between 12 to 20 members, all forming part of a bigger team with each section handling different aspects. Teams are seated four to five people in an area roughly one to two meters apart facing two to three people in front and with their backs to between three and five people as illustrated in Figure 1. Everyone sits in front of at least one computer monitor and wears headphones. Calls come through automatically and last typically for a few seconds up to an hour.

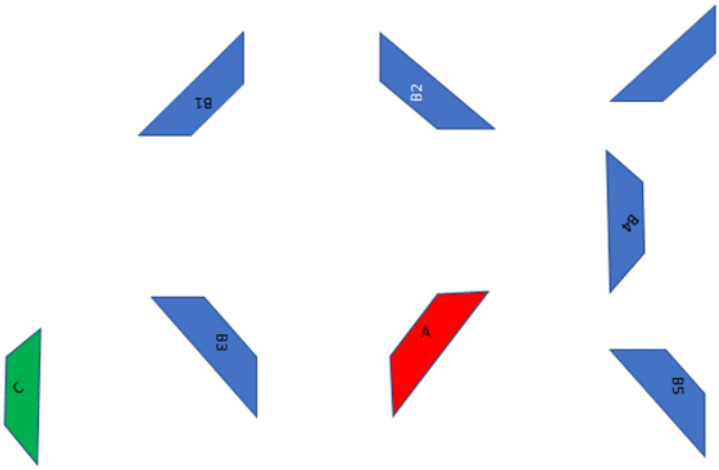

Figure 1: schematic drawing showing the layout of the call centre department. A=participant, B1-5=colleagues, C=manager

2.5 Study Design

The study incorporated an n=1 (A-B-A-B) single case study design with a feasibility component using survey-based and observational methods. Ethical approval to conduct the study was obtained from Stellenbosch University's Health Research Ethics committee (Ethics Reference #: S17/04/083). Approval to conduct the study at the selected company was obtained from management. Written informed consent (Appendix 3 a-c) was obtained from all participants (including colleagues and managers) involved prior to commencement of the study.

Figure 2 below illustrates the study design and the procedure that was followed over the five-week period of the study.

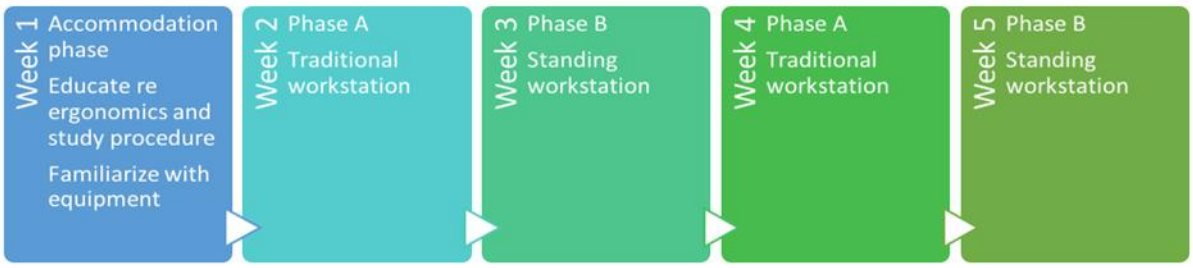

Figure 2: n=1 Study design (Traditional Workstation = participant using company workstation setup; Standing Workstation =participant using the standing desk, anti-fatigue mat and wobble stool during the day)

2.6 Questionnaires and data collection tools

Data collection was done over a five-week period (26 September 2017 to 27 October 2017), divided into alternating weeks of sitting and standing with a one-week accommodation period for the participant to familiarize himself with the equipment. The participant's company-issued workstation was swopped during the standing weeks to accommodate the standing workstation which consisted of a sit-stand desk, wobble stool and active standing mat. To make the workstation ergonomically sound, monitor raisers were fitted to raise his screens to the correct height, i.e. eye-level with the top of the monitor screen.

The participant was asked to complete Numeric Pain Rating Scale (NPRS) and Oswestry Disability Index (ODI) questionnaires relating to his back pain and symptoms over the past week prior to the start of the study.

2.7 Collection and Outcome measurement tools

The following outcome measurement and data collection tools were used in this study:

- *Numeric Pain Rating Scale*

The NPRS (Appendix 4) was used to measure pain levels relating to perceived work-related LBP experienced by the participant. The NPRS is an 11-point self-report scale used to subjectively measure the intensity of MS pain experienced during and after work activities. The minimum score on the NPRS is 0 (indicating no pain) and the maximum score is 10 (indicating worst pain). In previous published literature on the NPRS reliability, the intraclass correlation coefficient was found to be 0.76 and the test-retest reliability of the NPRS measurements was high (0.90) (12).

- *The Oswestry Low Back Pain Questionnaire*

The Oswestry Low Back Pain Disability Questionnaire also known as the Oswestry Disability Index (ODI) (Appendix 5) was used to determine the degree of disability due to perceived work-related LBP as experienced by the participant. The ODI is considered the Gold Standard of functional outcome tools for the lower back (9).

- *Questionnaires*

Specifically designed open- and closed ended questionnaires for the participant, colleagues and the participant's manager were used to collect data regarding the feasibility of implementing standing workstations in a call centre (Appendices 6 a-c).

- *Daily Timesheet*

Specifically-developed timesheets were provided to the participant to record daily activity (Appendix 7).

2.8 Equipment: standing workstation

The standing workstation consisted of an Ergotron Workfit-T standing desk, a wobble stool and anti-fatigue standing mat from UNCAGED Ergonomics (www.uncagedergonomics.com).

The Workfit-T desk converter (Figure 3) is a user-friendly easily adjustable sit-stand workstation with a gas lift mechanism for positional change within seconds. It is height adjustable and suitable to use comfortably in sitting or standing.

Figure 3: Ergotron Workfit-T desk converter

The wobble stool (Figure 4) is an active chair. It has a rubber weighted base to counter-balance the user's weight and prevent slipping while seated. This stool is designed as a midway between sitting and standing to relieve strain on the back and legs while helping to improve posture.

Figure 4: Uncaged Ergonomics Wobble Stool

Figure 5: Uncaged Ergonomics active standing mat

The active standing mat (Figure 5) is a contoured anti-fatigue mat with built-in walls and a ball to encourage movement and circulation while standing.

2.9 Data management and presentation

The changes in ODI and NPRS scores over the five-week study period were presented using graphs, as the sample was too small for any definite statistical inferences to be made. The open-ended answers obtained from the questionnaires administered to the colleagues and the manager were collated and similarities sought between responses.

The responses for the participant, as well as the responses from the colleagues and the manager were reported in a table for ease of reading.

3. Results

3.1 Time spent sitting and standing

The call centre agents spent a minimum of 8 hours 30 minutes at work daily of which 7 hours (82%) are dedicated to work. A normal workday could however be up to 10 hours with overtime included. Prior to data capturing the participant spent his entire workday seated at his desk and was only allowed two 15-minute tea breaks and 1-hour lunch.

These call centre agents are not allowed to take unscheduled breaks due to the nature of the job, i.e. a set number of agents must be available to take calls always to fulfil productivity and company standards.

The participant was standing on average 66% of the time weekly over the three weeks spent testing with the standing workstation. The rest of the workday was spent perch sitting on the wobble stool. The participant opted not to sit on his normal office chair at all during the standing weeks. This is more than half of the workday spent in standing. In the sitting weeks when the equipment was not available the increase in ODI and NPRS could be indicative of discomfort with the participant being unable to change posture but still having to deal with productivity pressures.

Table 1 below shows the participant's adoption of the standing posture at during data capturing. This data was captured using daily timesheets (Appendix 7).

Table 1: Hours spent standing per week

Week	Hours Standing	Percentage
Week 1 - max 28hrs	19hrs	68
Week 3 - max 35hrs	23hrs 30mins	67
Week 5 - max 33hrs	21hrs	64
Workday = 8hrs 30mins where 1hr30mins = breaks		

3.2 Changes in pain scores

The results indicated a decrease in NPRS scores in the standing weeks from week 1 to week 3 and no further change from week 3 to week 5. Figure 6 shows the NPRS scores during data capturing. It was noted that the NPRS scores for the sitting weeks remained unchanged but was higher compared to the standing weeks. The participant thus experienced increased pain in the sitting posture. No further details regarding the reasons for the pain scores remaining unchanged in the sitting weeks were obtained.

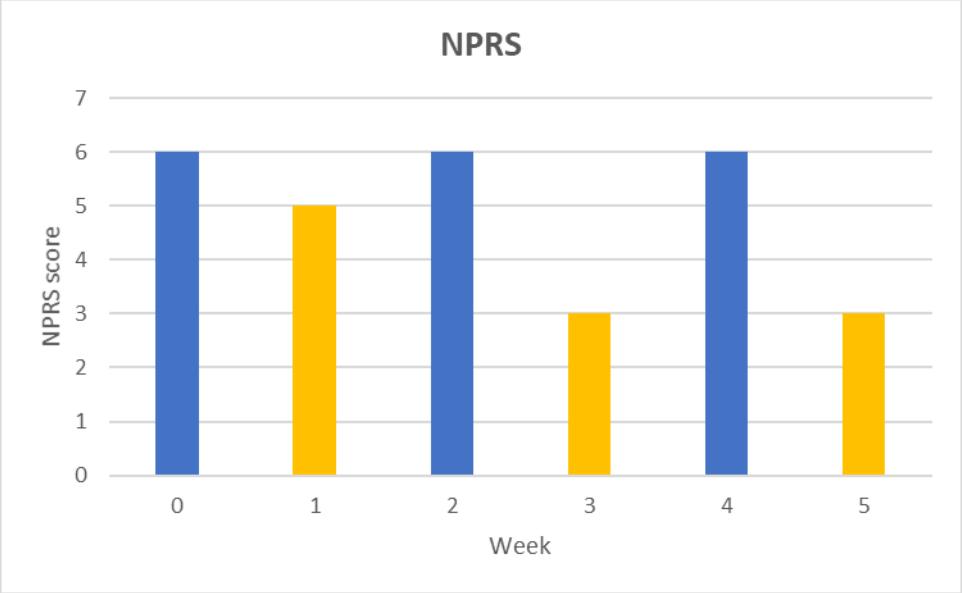

Figure 6: Graph indicating level of pain during the testing period. Weeks 1, 3 and 5 indicates standing weeks

3.3 Change in disability scores

As depicted in Figure 7 below, the ODI scores also showed a similar downward trend but conversely, this remained on a downward slope over the standing weeks. The standing posture appears to have had a positive effect on the participant's overall disability.

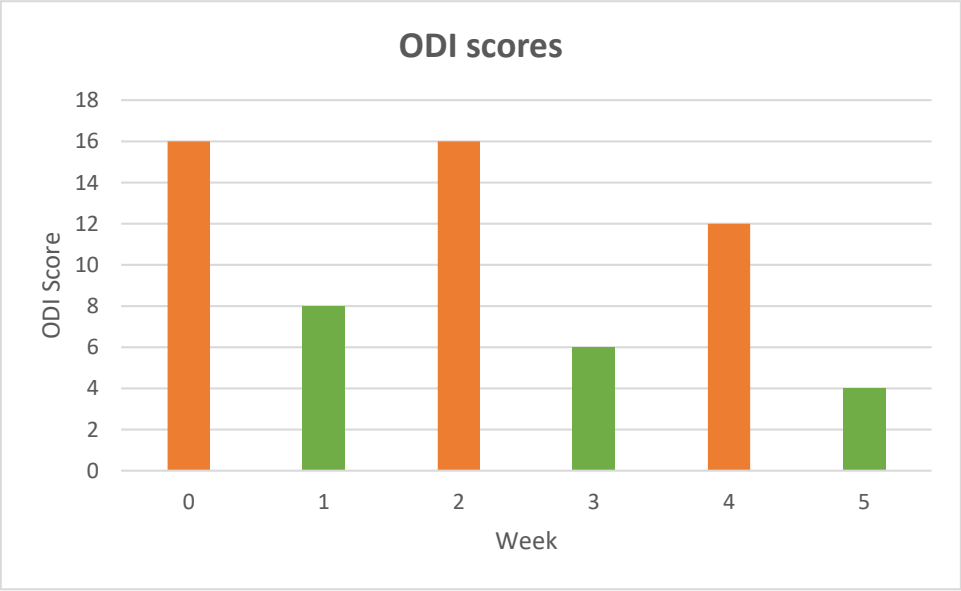

Figure 7: Graph indicating change in disability. Weeks 1, 3 and 5 indicates standing weeks

Figure 8 below is a visual depiction of how the NPRS and ODI scores changed over the five weeks.

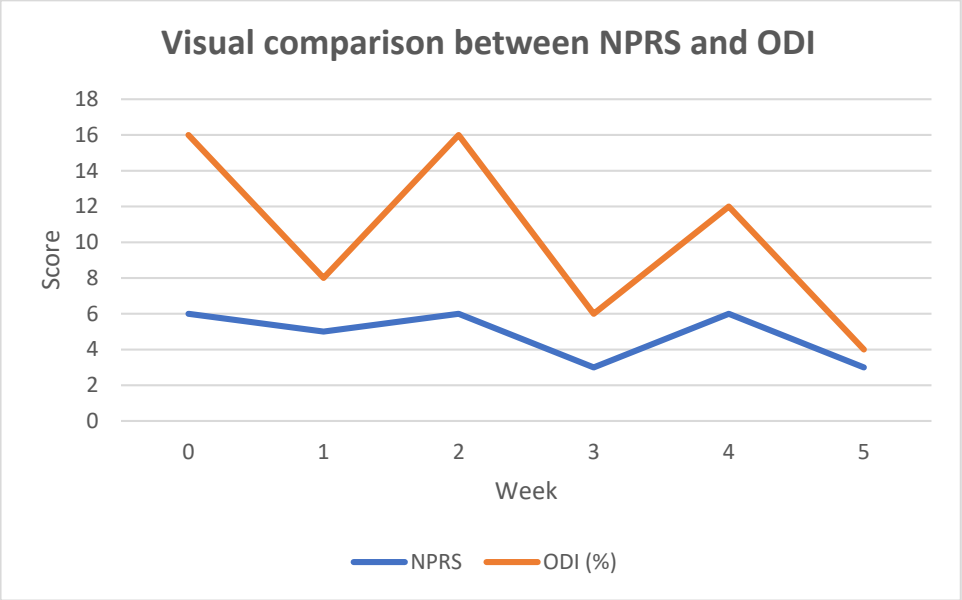

Figure 8: Graph showing the trends of the NPRS and ODI over the 5 weeks

3.4 Participant's experience

Following the data capturing period, the participant was asked to complete a follow-up questionnaire (Appendix 6a). As can be seen in Table 2 below, the participant reported being comfortable working in the standing posture and that he believed this relieved his pain. The participant also liked the workstation and experienced it easy to use and would recommend standing at work. The participant did however remark that his productivity was not affected and remained the same as when sitting although he felt more alert and energized in the standing posture and preferred standing over sitting.

Table 2: Participant feedback post data capturing

Participant Feedback

	YES	**NO**
Was it easy to use the equipment?	X	
Did you like using the work station?	X	
Were you comfortable working in standing?	X	
Do you still have pain as described above?		X
Would you say this is due to the standing workstation?	X	
Would you recommend standing at work?	X	
How long did it take you to get used to the standing workstation?	1 week	
Were you distracted by anything at all while using the workstation? If yes, please elaborate? No		
Do you think your productivity has changed at all while standing? Better / Worse / **Same**		
What do you prefer – sitting or **standing**?		
If you could make any changes to it what would it be? *Space for the mouse will be increased and less noise when stabilising desk, easier maybe push of a button to lift.*		

3.5 Colleagues' feedback

Table 3 below illustrates the colleagues' feedback following data capturing. None of the participant's five colleagues who completed a questionnaire (Appendix 6b) had used a standing workstation before. Three out of the five colleagues indicated that they would recommend using a standing workstation. They also thought that a standing workstation is a feasible option in the call centre. One of the two colleagues who indicated that they would not recommend standing workstations for the call centre elaborated by adding: *'I like sitting and having to stand as an option.'* and *'the chair does not look comfortable.'* The second colleague just said that it is not something they would want to use but indicated that it could be feasible

option to those who would want it. Thus, 4 out of 5 thought that it is a feasible option for a workstation.

Of the 5 colleagues to whom the participant gave feedback to, 4 reported that he only had good things to say and that he really enjoyed the standing workstation.

3.6 Management feedback

The participant's manager completed the management questionnaire (Appendix 6c) and reported: *'I do believe the concept would yield positive results in both the servicing aspect as well as the healthy state of the agent.'* and that the workstation was not disruptive, instead *'it more sparked an interest from the greater call centre in what was being done.'* He also echoed the colleagues' sentiments in that no-one reported any complaints to him during the data capturing period. He was also of the opinion that a standing workstation is a feasible option for call centre workers

Table 3: Colleague feedback following data capturing

		C1	C2	C3	C4	C5
1	Did your colleague's new workstation disrupt your routine in any way? Please elaborate:	"No"	"No"	"No, at first, maybe the first two days it was different, but we got used to it eventually"	"No, my working was uninterrupted."	"No"
2	Are you aware of any complaints from this user relating to his / her current workstation? Please elaborate	"No"	"No"	"No"	"No"	"No"
3	Was this process disruptive to you or your team? Please elaborate:	"No"	"No"	"No"	"No, it did not disrupt my team."	"No"
4	Would you recommend using standing workstations in the call centre? Please elaborate:	"No, I like sitting and having to stand as an option. The chair does not look comfortable."	"Yes, as long as the height can be adjusted."	"No, Personally I wouldn't want it."	"Yes, it gives the agent freedom of choice."	"Yes, this will allow increase in one's energy."
5	Have you tried out the workstation yourself? If yes, what did you think of it? Would you like to have one?	"No"	"No"	"No"	"Yes"	"No"
6	Did your colleague give you any feedback on his/her experience using the workstation? Please share a few thoughts:	"Yes, He likes it a lot."	"No"	"Yes"	"Yes"	"Yes"
7	Would you say it is feasible to use a standing workstation in a call centre?	"No"	"Yes"	"Yes"	"Yes"	"Yes"
8	What was the feedback from your management team?	"I have not heard any feedback from management."		"I didn't get any feedback or hear anything from my management team."	"N/A"	"I have not received any feedback from management personally."

4. Discussion

Standing desks have become more popular over the past few years. However, the possible benefits and the feasibility of implementing a complete standing workstation (sit-stand desk, anti-fatigue mat, active chair e.g. wobble stool) in a call centre are not yet known. The primary aim of this pilot study was to explore the efficacy of a standing workstation on perceived work-related LBP and related disability in call centre workers. The secondary aim of this study was to test the feasibility and ease of incorporating a standing workstation in a busy, densely-populated call centre in Cape Town, South Africa.

The study showed a decrease in time spent sitting along with a reduction in LBP during the weeks the participant used the standing workstation. Although statistical significance could not be determined due to the small sample size the visual representation of the change in the ODI and NPRS scores could serve as a preliminary indication that the use of a standing workstation may influence LBP and disability experienced by call centre workers. Since this study was merely a pilot study to determine the logistics of conducting a larger study the findings cannot be generalised to all call centre companies. More detail could however have been established around the exact reasons why there was no change in the NPRS in the sitting weeks. For this reason, further research is required before prescriptions can be made to companies on changing policies regarding the implementation of standing workstations in call centres.

The results of this pilot study showed that the participant was standing on average 66% of the time during the three weeks of testing with the standing workstation. The rest of the time was spent perch sitting as the participant opted to use the wobble stool instead of his normal office chair. Hence, the participant was never completely sedentary during testing with the sit-stand workstation as perching allows for more mobility by encouraging knee movement during the

perch(13). This could be a further contributing factor to the reduction experienced in his LBP as Le et al. (13) also claims that perching allows for decreased spinal loading. The participant thus spent more than half of the workday in standing daily during the standing weeks of data capturing. This is in keeping with the findings of several studies that reported reductions in sedentary time and sitting at work due to a direct increase in standing time among sit-stand workstation users (14,15). In their meta-analysis of 19 field-based trials and laboratory investigations respectively Wallmann-Sperlich et al. (16) also, found that the participants were sitting 77 minutes less per eight-hour workday due to having a sit-stand desk available at work (16). Although this study's findings are based on a single subject, the change in sedentary time is noteworthy. Further research is however required to confirm the effect standing workstations would have on the overall sedentary time of call centre workers, and whether the change results in other positive outcomes.

As seen from the daily timesheets completed by the participant (Table 1), it is noted that the time spent standing was an equal split of proportions throughout the day. This finding indicates that the participant had a good understanding of his levels of discomfort and was making use of the equipment when he felt the need to change his posture.

The participant's management of time spent standing suggests that having a sit-stand workstation at hand could allow a call centre worker the option to be comfortable throughout the working day. This is an important finding especially in the call centre environment where employees with MS pain spend long hours at their desks with very little opportunity to move around due to the requirements of the job. This is comparable with the findings by Karol et al. (15) who noted that spending at least one hour of standing throughout the workday (out of an 8-hour workday) led to a reduction in MS discomfort. Once again however, the effect of the standing workstation on MS discomfort cannot be stated for certain until further research has been conducted.

In the study by Dutta et al. (17) the participants experienced back pain in the seated posture after prolonged periods prior to introducing sit-stand desks. They found that breaking up sedentary time significantly reduced complaints of back pain which is congruent with the findings of Husemann et al.(18) that found a reduction in MS discomfort among data entry office workers. Furthermore, changing posture from sitting to standing causes the large muscles of the legs and trunk to pump blood through the MS system which is a positive energy expenditure and a break from sitting (i.e. less sedentary time) without negatively affecting productivity (16,19). Before data capturing, the participant spent a minimum of seven hours seated as per his job requirement, which he attributed to be the main contributing factor to his LBP. The reduction in LBP due to use of the standing workstation is thus a positive finding and probable proof that standing can reduce LBP in call centre agents and office workers alike (13). The findings of the current study are in line with previous research that showed a reduction in back discomfort due to use of sit-stand workstations and that switching between sitting and standing routinely is effective in reducing LBP and/or discomfort (13,19). Introducing a standing workstation into a traditional call centre may thus be a good way of reducing sedentary time amongst call centre workers(19) which may lead to less MS pain. However, further research is required before concrete recommendations can be made.

In a previous study, researchers compared an active workstation to a traditional office setup and found that the active desk users were 51% less likely to report low back discomfort. They hypothesised that this was due to the reduction in sedentary time (20). In the current study the participant reported a reduction in disability due to LPB as seen by a drop in ODI scores during the standing weeks. In the current study, the ODI trend remained on a downward slope during the three weeks spent standing. This is an encouraging finding as it indicated a reduction in work-related disability due to LBP when working in the standing posture. It could again be attributed to the freedom the participant had to make the necessary postural adjustments when needed. Conversely, the increase in ODI% by almost two points during weeks 2 and 4 when

the participant only had the traditional sitting workstation is indicative of an increase in disability and/or aggravation of LBP due to sitting. If employees had adjustable equipment that allowed them to optimise their posture for optimal comfort it could lead to a reduction in MS discomfort. This is in keeping with a recent study where the researchers found a 54% reduction in complaints of MS pain between the control (traditional sedentary office set up) and intervention (sit-stand desk) groups (17). However, since the findings are based on a single subject, firm conclusions regarding the effect of standing workstation on disability cannot be made. It is suggested that further, larger studies be conducted to confirm or negate this finding.

The participant reported an overall positive experience using the standing workstation. Although this finding cannot be generalized to other office workers or other settings, it is important to know if the experience of using standing station was a positive one.

It would thus appear that comfort is an important factor for our participant as it is for the participants in the study by Pickens et al.(21) where around 75% of standing workstation users highlighted comfort provided by the standing desks to be a motivating factor during work tasks. The participant's only complaint was that the keyboard tray of the desk used during testing was limiting in terms of space as was the case for the focus group in the study by Dutta et al. (17). Similarly, reduction of desk space was a frequent complaint associated with sit-stand desk use (25%) and loss of privacy was reported by some (11%)(17). This is a common complaint in practice, but something that is easy to correct, for example by changing to a smaller keyboard or a bigger sit-stand desk that allows bigger keyboard tray space. The fact that this was the only complaint by the participant is another positive finding. Again, however the findings should be viewed with caution based on the single subject design, but the feedback is useful, nonetheless.

The participant's colleagues reported that the participant enjoyed the comfort and option of having the standing workstation. The manager also gave positive feedback and believes

implementing standing workstations could be feasible in a call centre environment if administered correctly. It appears that the implementation of the standing workstation did not disrupt the colleagues and/or management. The colleagues were however split regarding the use of a standing workstation as some felt it could be uncomfortable, although none of the colleagues tested the equipment themselves. What is interesting about this study is that the real-life situation of shared office space that is typically seen in a call centre was taken into consideration by involving the participant's immediate colleagues and manager. Since various role-players work together in a call centre department, ascertaining if it would be feasible to implement a standing workstation in a call centre, and how it could potentially impact others, and not just its user is important to establish. This pilot study provides a preliminary starting point and foundation from which larger studies can be derived.

Since this was a pilot study, it was expected that there would be issues that would have to be addressed in future research. Several limitations were identified in the current study and should be highlighted as these are aspects that can be addressed and improved upon in future research.

The benefit of conducting pilot studies is that the logistics of conducting larger studies can be ascertained before funds are spent on a venture that may not practically be possible to study in the first place. The main issues in this study were linked to small sample size and the length of time allocated for data capturing. Had it been possible, and had adequate resources been available, additional cases could have been added and the time frame allocated for data collection could have been extended. Furthermore, although the use of case studies may be viewed as a limitation, the specific use of a single case study which included an actual departmental call centre team was positive since it was a true reflection of a working day in a call centre. Future research may therefore improve on these limitations, but it is recommended that real-life situations are always considered.

Conclusion

In conclusion, though the study design may have been lacking rigour it served as a good vehicle to explore the efficacy and feasibility of introducing a standing workstation into traditional office environments, e.g. a call centre. The participants involved in this study involved a complete departmental team (employees and management) and provided positive feedback on feasibility from a team perspective. Though the findings cannot be generalised to all office environments or call centres it does provide insight to the daily work-life of a call centre agent and how the change of a workstation affected his daily routine. Despite the shortcomings of the study, the findings did show a reduction in disability and pain due to LBP in a call centre agent. The study also showed a reduction in sedentary time and adoption of standing as a viable work posture. It also further provided positive feedback on the feasibility of standing workstations in call centres. Further research should thus focus on larger samples and a wider population and perhaps on different workstation setups as well as other MSDs.

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CHAPTER 3

Summary

The following chapter will provide a summary of the current study in terms of what we did, what we found, what we recommend and the significance of the findings.

What we did

The aim of the current study was to ascertain the efficacy of a complete standing workstation (sit-stand desk, active chair e.g. wobble stool, anti-fatigue standing mat) on perceived work-related LBP and related disability amongst call centre workers and to further explore the feasibility of incorporating a standing workstation in a call centre environment. The study was conducted at a high-paced densely-populated (500 workers) national corporate call centre situated in Cape Town, South Africa. The study incorporated an n=1 (A-B-A-B) single case study design and was conducted over a period of five weeks. Ethical approval to conduct the study was obtained from Stellenbosch University's Health Research Ethics committee. Approval to conduct the study at the selected company was obtained from management. Written informed consent was obtained from all participants (including colleagues and managers) involved prior to commencement of the study. Data collection over the five-week period was divided into alternating weeks of sitting and standing with a one-week accommodation period for the participant to familiarize himself with the equipment. The participant's company-issued workstation was swopped during the standing weeks to accommodate the standing workstation which consisted of a sit-stand desk, wobble stool and a standing mat. The participant was asked to complete the NPRS and ODI questionnaires relating to his back pain and symptoms over the past week.

Specifically designed open- and closed ended questionnaires for the participant, colleagues and the participant's manager was used to collect data regarding the feasibility of implementing standing workstations in a call centre.

What we found

- The participant was a 21-year-old male, 1.68m tall and weighing 64kg.
- The participant had self-reported work-related LBP and discomfort during his workday after he started working as a call centre agent.
- The participant has been working in the call centre environment for approximately three years of which the last year was at the call centre in question.
- The call centre agents spent a minimum of 8 hours 30 minutes at work daily of which 7 hours (82%) are dedicated to work.
- Prior to data capturing the participant spent his entire workday seated at his desk and was only allowed two 15-minute tea breaks and 1-hour lunch.
- The participant was standing on average 66% of the time over the three weeks spent testing with the standing workstation.
- In the sitting weeks when the equipment was not available the increase in ODI and NPRS could be indicative of discomfort with the participant being unable to change posture but still having to deal with productivity pressures.
- The results indicated a decrease in NPRS scores in the standing weeks.
- The NPRS scores for the sitting weeks remained unchanged but higher compared to the standing weeks, i.e. increased pain in the sitting posture.
- The ODI scores also showed a downward trend but this remained on a downward slope over the standing weeks, i.e. standing had a positive effect on the participant's overall disability.
- The participant remarked that his productivity was not affected and remained the same as when sitting although he felt more alert and energized in the standing posture and preferred standing over sitting.
- Three out of the five colleagues indicated that they would recommend using a standing workstation.
- They also thought that a standing workstation is a feasible option in the call centre.
- The participant's manager was also of the opinion that a standing workstation is a feasible option for call centre workers.

- The increase in ODI% by almost two points from standing to sitting is positive as this indicates an increase in disability and aggravation of the MSD due to sitting.
- This is preliminary proof that the use of a standing workstation does not only allow for reducing time spent sitting but is beneficial in reducing disability due to MSDs (e.g. LBP) among call centre agents.

What we recommend

In conclusion, though the study design may have been lacking rigour it served as a good vehicle to explore the efficacy and feasibility of introducing a standing workstation into traditional office environments, e.g. a call centre. The participants involved in this study involved a complete departmental team (employees and management) and provided positive feedback on feasibility from a team perspective. Though the findings cannot be generalised to all office environments or call centres it does provide insight to the daily work-life of a call centre agent and how the change of a workstation affected his daily routine. Despite the shortcomings of the study, the findings did show a reduction in disability and pain due to LBP in a call centre agent. The study also showed a reduction in sedentary time and adoption of standing as a viable work posture for a call centre agent who have little or no opportunity to move about freely during the workday. It also further provided positive feedback on the feasibility of standing workstations in call centres.

Further research should focus on larger samples and a wider population and perhaps on different workstation setups as well as other MSDs before definitive conclusions can be made regarding its feasibility and effect. However; based on these preliminary findings, standing workstations may be a viable alternative for call centre workers and other office workers. As it stands, companies in the process of renovating or starting new office spaces would do no harm incorporating standing workstations within their administrative (e.g. call centres) departments as part of the office furniture procurement.

APPENDIX 1: Letter to company

To: (Name of company here)

From: Shaun D. Maart

RE: REQUEST FOR PERMISSION TO CONDUCT STUDY AT OFFICES

To whom it may concern,

I am currently registered at Stellenbosch University as a master student in Physiotherapy. My master's project entails establishing the feasibility of implementing standing workstations in high pressure call centres in South Africa.

The primary aim of the study is to explore the feasibility and ease of incorporating a standing workstation in the call centre environment.

Since (Company Name Here) is one of the major corporate entities in the Cape Metropole area, and houses a major call centre, it is envisaged that this a suitable environment for a study of this kind.

The study will take place over a three-week period commencing June 2017 with minimal disruption to staff and work operations.

We therefore request permission to conduct the study at your offices please.

For more information, please contact me via email at shaundmaart@gmail.com or via cell 081 55 44 528. You are also welcome to contact my supervisor, Dr Linzette Morris (details below) for more information.

Please sign below as confirmation that you give us permission to conduct the study at your call centre:

Name:

Designation:

Signature:

Date:

Yours Sincerely,

Shaun Maart

Supervisor: Dr Linzette Morris (Division of Physiotherapy) Tel:

APPENDIX 2: Screening questionnaire

Good Day,

You are hereby invited to take part in a research project at your company. The aim of the project is to determine the feasibility and ease of incorporating a standing workstation in traditional call centres.

Should you be selected to take part in the project you will be asked to change your current workstation for a sit-stand setup. The standing workstation consists of a sit-stand desk, ergonomically certified chairs, an ant-fatigue mat and other peripherals to make your workstation as ergonomic as possible for ease of doing your work tasks.

If you are interested in taking part in the study, please answer the following questions:

Are you Male or Female?	
If female, are you currently pregnant?	
How old are you currently?	
How long have you been working in the call centre?	
Do you have any pain/discomfort during the working day?	
Do you sit for at least 6 hours during the working day?	
Have you had any previous orthopaedic surgery in the past?	
Do you have any chronic Musculoskeletal or Neurological condition or disease?	
Do you use any medication – mood enhancing and/or chronic?	
Do you suffer from depression?	
Are you currently undergoing any major life events, e.g. divorce, bereavement, illness or any employment related issues that could lead to dismissal / are you currently under supervision for misconduct at work?	

Should you be shortlisted as a possible candidate to take part in this project you will be contacted again via email. Should you not hear from us within two weeks you have not been shortlisted. Thank you for your time.

Thank you for completing the screening questionnaire.

For any further enquiries please contact the researcher via email at shaundmaart@gmail.com.

APPENDIX 3a: PARTICIPANT INFORMATION LEAFLET AND CONSENT FORM (Participant)

TITLE OF THE RESEARCH PROJECT: The efficacy and feasibility of incorporating a standing workstation for perceived low back pain and disability, as well as productivity, among call centre workers: a case study.

Principle investigator: Mr Shaun Maart

Contact number:

REFERENCE NUMBER: S17/04/083

We would like to invite you to take part in a research project which involves the use of a standing workstation by you at work and the completion of an online questionnaire. Your participation is **entirely voluntary** and you are free to decline to participate or to stop completing the questionnaire at any time, even if you have agreed to take part initially. However, once you have submitted your completed questionnaire online, you will no longer be able to withdraw your responses as there will be no way of linking your responses back to you.

This study has been approved by the **Health Research Ethics Committee at Stellenbosch University** and will be conducted according to the ethical guidelines and principles of the international Declaration of Helsinki, South African Guidelines for Good Clinical Practice and the Medical Research Council (MRC) Ethical Guidelines for Research.

What is this research study all about?

As you know, call centre work is particularly associated with prolonged sitting and is characterized by long working shifts in front of a computer with few opportunities for work posture variation. Prolonged sitting often leads to lower back pain, and other pains and is not good for your health. It is recommended that office workers, in particular call centre workers change their positions regularly throughout the day. One way in which to do this is to use a standing workstation which allows the user to go from sitting to standing in a second and to change positions often throughout the day. However, at this point although we may know that standing workstations are beneficial for you, we do not know how easy it would be to incorporate them into a call centre environment. The aim of this study is to explore the effect of a standing workstation on low back pain in call centre workers and to test the feasibility and ease of incorporating a standing workstation in a call centre environment as well as any potential pitfalls a standing workstation may have on the participant and work performance.

Why have you been invited to participate?

You were invited to participate in our project because you work as a call centre agent. You also met all the relevant criteria for participating in the study project.

What will your responsibilities be?

Once you agree to participate in this study, the following will happen:

- You will receive the standing workstation and it will be set up at your work place. You will use the standing workstation for three weeks over a five-week period. You will be instructed on how to use it, and on the benefits of the standing workstation.
- Data collection will take place over a normal full working week starting on the Monday and ending at close of business on the Friday.
- You will complete a baseline questionnaire and a post-intervention questionnaire after each week following data collection. This will be done online.
- The questionnaires will include built-in demographic questions as well as questions relating to the effect of standing at work on your low back pain and the feasibility of using a workstation at your workplace.
- After using the workstation, you will complete another online questionnaire.
- Five of your colleagues sitting around you and your line manager will also be given a questionnaire to complete online about the ease of incorporating a workstation at your workplace.
- Thereafter the data will be analysed by the researcher**.**
- Your responsibilities are to familiarize yourself with the equipment being used during the data collection period.

Will you benefit from taking part in this research?

You will benefit by gaining knowledge of what office ergonomics entails and by learning the basic principles thereof for your future work life.

Are there in risks involved in your taking part in this research?

There are no known risks if you abide to the instructions given. If you however stand for too long you may develop swelling at the ankle, but this can be reduced by moving around and alternating the weight-bearing leg, perch-sitting or short periods of intermittent sitting in your office chair.

You can phone the Principal Investigator of this study, Mr. Shaun Daryl Maart at 081 55 44 528 or email shaundmaart@gmail.com if you have any questions about this study or encounter any problems.

You can phone the Health Research Ethics Committee at 021 938 9677/9819 if there still is something that concerns you about how this study is being conducted, or if you have a complaint.

You will receive a copy of this information and consent form for you to keep safe.

Will you be paid to take part in this study and are there any costs involved?

You will receive a Woolworths voucher should you take part in the study. There will be no costs involved for you, if you do take part.

Declaration by participant

By signing below, I ……..……. agree to take part in a research study entitled *(insert title of study)*.

I declare that:

- I have read or had read to me this information and consent form and it is written in a language with which I am fluent and comfortable.
- I have had a chance to ask questions and all my questions have been adequately answered.
- I understand that taking part in this study is **voluntary** and I have not been pressurised to take part.
- I may choose to leave the study at any time and will not be penalised or prejudiced in any way.
- I may be asked to leave the study before it has finished, if the study doctor or researcher feels it is in my best interests, or if I do not follow the study plan, as agreed to.

Signed at (*place*) .....…..…….. on (*date*) ……...…….. 2017.

....

Signature of participant **Signature of witness**

Declaration by investigator

I *(name)* ……..…… declare that:

- I explained the information in this document to ……..
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understands all aspects of the research, as discussed above
- I did/did not use a interpreter. (*If a interpreter is used then the interpreter must sign the declaration below.*

Signed at (*place*) .....…….. on (*date*) ……...…….. 2017.

....

Signature of investigator **Signature of witness**

APPENDIX 3b: PARTICIPANT INFORMATION LEAFLET AND CONSENT FORM (Colleagues)

TITLE OF THE RESEARCH PROJECT: The efficacy and feasibility of incorporating a standing workstation for perceived low back pain and disability, as well as productivity, among call centre workers: a case study.

Principle investigator: Mr Shaun Maart

Contact number:

REFERENCE NUMBER: S17/04/083

We would like to invite you to take part in a research project which involves the use of a standing workstation by you at work and the completion of an online questionnaire. Your participation is **entirely voluntary** and you are free to decline to participate or to stop completing the questionnaire at any time, even if you have agreed to take part initially. However, once you have submitted your completed questionnaire online, you will no longer be able to withdraw your responses as there will be no way of linking your responses back to you.

This study has been approved by the **Health Research Ethics Committee at Stellenbosch University** and will be conducted according to the ethical guidelines and principles of the international Declaration of Helsinki, South African Guidelines for Good Clinical Practice and the Medical Research Council (MRC) Ethical Guidelines for Research.

What is this research study all about?

As you know, call centre work is particularly associated with prolonged sitting and is characterized by long working shifts in front of a computer with few opportunities for work posture variation. Prolonged sitting often leads to lower back pain, and other pains and is not good for your health. It is recommended that office workers, in particular call centre workers change their positions regularly throughout the day. One way in which to do this is to use a standing workstation which allows the user to go from sitting to standing in a second and to change positions often throughout the day. However, at this point although we may know that standing workstations are beneficial for you, we do not know how easy it would be to incorporate them into a call centre environment. The aim of this study is to explore the effect of a standing workstation on low back pain in call centre workers and to test the feasibility and ease of incorporating a standing workstation in a call centre environment as well as any potential pitfalls a standing workstation may have on the participant and work performance.

Why have you been invited to participate?

You were invited to participate in our project because you work as a call centre agent and you sit close to the participant who is participating in this study.

What will your responsibilities be?

Once you agree to participate in this study, the following will happen:

- You will complete a questionnaire at the end of the week. This will be done online.
- The questionnaire will include questions relating to the feasibility of your colleague using a workstation at the workplace.
- Thereafter the data will be analysed by the researcher**.**
- Your responsibilities are to carry on with your work as usual and to observe any differences in your work due to the standing workstation.

Will you benefit from taking part in this research?

You will benefit by gaining knowledge of what office ergonomics entails and by learning the basic principles thereof for your future work life.

Are there in risks involved in your taking part in this research?

There are no known risks to you if you participate in this study.

You can phone the Principal Investigator of this study, Mr. Shaun Daryl Maart at 0000 or email xxxx if you have any questions about this study or encounter any problems.

You can phone the Health Research Ethics Committee at 021 938 9677/9819 if there still is something that concerns you about how this study is being conducted, or if you have a complaint.

You will receive a copy of this information and consent form for you to keep safe.

Will you be paid to take part in this study and are there any costs involved?

You will receive a Woolworths voucher should you take part in the study. There will be no costs involved for you, if you do take part.

Declaration by participant

By signing below, I ……..……. agree to take part in a research study entitled *(insert title of study)*.

I declare that:

- I have read or had read to me this information and consent form and it is written in a language with which I am fluent and comfortable.
- I have had a chance to ask questions and all my questions have been adequately answered.
- I understand that taking part in this study is **voluntary** and I have not been pressurised to take part.
- I may choose to leave the study at any time and will not be penalised or prejudiced in any way.
- I may be asked to leave the study before it has finished, if the study doctor or researcher feels it is in my best interests, or if I do not follow the study plan, as agreed to.

Signed at (*place*) .....…..…….. on (*date*) ……...…….. 2017.

....

Signature of participant **Signature of witness**

Declaration by investigator

I *(name)* ……..…… declare that:

- I explained the information in this document to ……..
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understands all aspects of the research, as discussed above
- I did/did not use an interpreter. (*If an interpreter is used then the interpreter must sign the declaration below.*

Signed at (*place*) .....…..…….. on (*date*) ……...…….. 2017.

....

Signature of investigator **Signature of witness**

APPENDIX 3c: PARTICIPANT INFORMATION LEAFLET AND CONSENT FORM (Management)

TITLE OF THE RESEARCH PROJECT: The efficacy and feasibility of incorporating a standing workstation for perceived low back pain and disability, as well as productivity, among call centre workers: a case study.

Principle investigator: Mr Shaun Maart

Contact number:

REFERENCE NUMBER: S17/04/083

We would like to invite you to take part in a research project which involves the use of a standing workstation by you at work and the completion of an online questionnaire. Your participation is **entirely voluntary** and you are free to decline to participate or to stop completing the questionnaire at any time, even if you have agreed to take part initially. However, once you have submitted your completed questionnaire online, you will no longer be able to withdraw your responses as there will be no way of linking your responses back to you.

This study has been approved by the **Health Research Ethics Committee at Stellenbosch University** and will be conducted according to the ethical guidelines and principles of the international Declaration of Helsinki, South African Guidelines for Good Clinical Practice and the Medical Research Council (MRC) Ethical Guidelines for Research.

What is this research study all about?

As you know, call centre work is particularly associated with prolonged sitting and is characterized by long working shifts in front of a computer with few opportunities for work posture variation. Prolonged sitting often leads to lower back pain, and other pains and is not good for your health. It is recommended that office workers, in particular call centre workers change their positions regularly throughout the day. One way in which to do this is to use a standing workstation which allows the user to go from sitting to standing in a second and to change positions often throughout the day. However, at this point although we may know that standing workstations are beneficial for you, we do not know how easy it would be to incorporate them into a call centre environment. The aim of this study is to explore the effect of a standing workstation on low back pain in call centre workers and to test the feasibility and ease of incorporating a standing workstation in a call centre environment as well as any potential pitfalls a standing workstation may have on the participant and work performance.

Why have you been invited to participate?

You were invited to participate in our project because you are the line manager/team leader in the call centre of the participant who is participating in this study.

What will your responsibilities be?

Once you agree to participate in this study, the following will happen:

- You will complete a questionnaire at the end of the week. This will be done online.
- The questionnaire will include questions relating to the feasibility of your colleague using a workstation at the workplace.
- Thereafter the data will be analysed by the researcher**.**
- Your responsibilities are to carry on with your work as usual and to observe any differences in your work due to the standing workstation.

Will you benefit from taking part in this research?

You will benefit by gaining knowledge of what office ergonomics entails and by learning the basic principles thereof for your future work life.

Are there in risks involved in your taking part in this research?

There are no known risks if you abide to the instructions given. If you however stand for too long you may develop swelling at the ankle, but this can be reduced by moving around and alternating the weight-bearing leg, perch-sitting or short periods of intermittent sitting in your office chair.

You can phone the Principal Investigator of this study, Mr. Shaun Daryl Maart at 00000 or email xxxxx if you have any questions about this study or encounter any problems.

You can phone the Health Research Ethics Committee at 021 938 9677/9819 if there still is something that concerns you about how this study is being conducted, or if you have a complaint.

You will receive a copy of this information and consent form for you to keep safe.

Will you be paid to take part in this study and are there any costs involved?

You will receive a Woolworths voucher should you take part in the study. There will be no costs involved for you, if you do take part.

Declaration by participant

By signing below, I ……..…… agree to take part in a research study entitled *(insert title of study)*.

I declare that:

- I have read or had read to me this information and consent form and it is written in a language with which I am fluent and comfortable.
- I have had a chance to ask questions and all my questions have been adequately answered.
- I understand that taking part in this study is **voluntary** and I have not been pressurised to take part.
- I may choose to leave the study at any time and will not be penalised or prejudiced in any way.
- I may be asked to leave the study before it has finished, if the study doctor or researcher feels it is in my best interests, or if I do not follow the study plan, as agreed to.

Signed at (*place*) .....…….…….. on (*date*) ……...…….. 2017.

....

Signature of participant **Signature of witness**

Declaration by investigator

I *(name)* ……..…… declare that:

- I explained the information in this document to ……..
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understands all aspects of the research, as discussed above
- I did/did not use an interpreter. (*If an interpreter is used then the interpreter must sign the declaration below.*

Signed at (*place*) .....…….…….. on (*date*) ……...…….. 2017.

....

Signature of investigator **Signature of witness**

APPENDIX 4: Numeric Pain Rating scale (NPRS)

Candidate ID number:

Date:

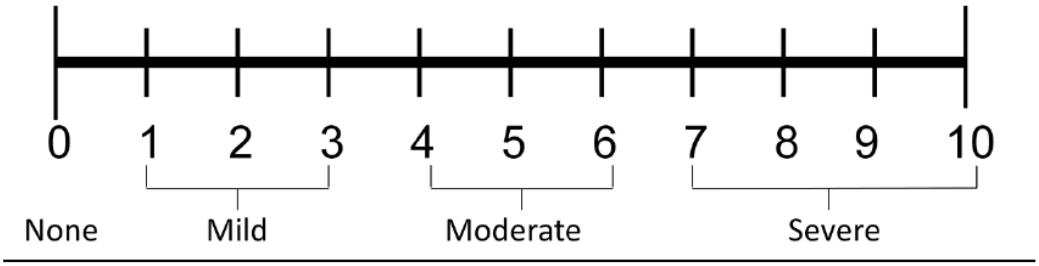
Week of study:

The following questionnaire aims to capture your pain experiences over the past week.

Please complete the following question using the scale provided.

Question 1: On a scale of 0 to 10 (with 0 being no pain, and 10 being the worst pain imaginable), what was the intensity of your pain over the last week?

Please mark number clearly.



APPENDIX 5: Oswestry Disability Index (ODI)

Oswestry Low Back Pain Disability Questionnaire

Instructions

This questionnaire has been designed to give us information as to how your back or leg pain is affecting your ability to manage in everyday life. Please answer by checking ONE box in each section for the statement which best applies to you. We realise you may consider that two or more statements in any one section apply but please just shade out the spot that indicates the statement which most clearly describes

your problem.

Section 1 – Pain intensity

- ☐ I have no pain at the moment
- ☐ The pain is very mild at the moment
- ☐ The pain is moderate at the moment
- ☐ The pain is fairly severe at the moment
- ☐ The pain is very severe at the moment
- ☐ The pain is the worst imaginable at the moment

Section 2 – Personal care (washing, dressing etc)

- ☐ I can look after myself normally without causing extra pain
- I can look after myself normally but it causes extra pain

Section 3 – Lifting

- ☐ I can lift heavy weights without extra pain
- ☐ I can lift heavy weights but it gives extra pain
- ☐ Pain prevents me from lifting heavy weights off the floor, but I can manage if they are conveniently placed eg. on a table
- ☐ Pain prevents me from lifting heavy weights, but I can manage light to medium weights if they are conveniently positioned
- ☐ I can lift very light weights
- ☐ It is painful to look after myself and I am slow and careful
- ☐ I need some help but manage most of my personal care

☐ I need help every day in most aspects of self-care

☐ I do not get dressed, I wash with difficulty and stay in bed

☐ I cannot lift or carry anything at all

Section 4 – Walking*

☐ Pain does not prevent me walking any distance

☐ Pain prevents me from walking more than _____PLOH

☐ Pain prevents me from walking more than 1_____PLOH

☐ Pain prevents me from walking more than _____\DUGV

☐ I can only walk using a stick or

☐ crutches I am in bed most of the time

Section 5 – Sitting

- ☐ I can sit in any chair as long as I like
- ☐ I can only sit in my favourite chair as long as I like
- ☐ Pain prevents me sitting more than one hour
- ☐ Pain prevents me from sitting more than 30 minutes
- ☐ Pain prevents me from sitting more than 10 minutes
- ☐ Pain prevents me from sitting at all

Section 6 – Standing

- ☐ I can stand as long as I want without extra pain
- ☐ I can stand as long as I want but it gives me extra pain
- ☐ Pain prevents me from standing for more than 1 hour
- ☐ Pain prevents me from standing for more than 30 minutes
- ☐ Pain prevents me from standing for more than 10 minutes
- ☐ Pain prevents me from standing at all

Section 7 – Sleeping

- ☐ My sleep is never disturbed by pain
- ☐ My sleep is occasionally disturbed by pain
- ☐ Because of pain I have less than 6 hours sleep
- ☐ Because of pain I have less than 4 hours sleep
- ☐ Because of pain I have less than 2 hours sleep
- ☐ Pain prevents me from sleeping at all

Section 8 – Sex life (if applicable)

- ☐ My sex life is normal and causes no extra pain
- ☐ My sex life is normal but causes some extra pain
- ☐ My sex life is nearly normal but is very painful
- ☐ My sex life is severely restricted by pain
- ☐ My sex life is nearly absent because of pain
- ☐ Pain prevents any sex life at all

Section 9 – Social life

- ☐ My social life is normal and gives me no extra pain
- ☐ My social life is normal but increases the degree of pain
- ☐ Pain has no significant effect on my social life apart from limiting my more energetic interests eg, sport
- ☐ Pain has restricted my social life and I do not go out as often
- ☐ Pain has restricted my social life to my
- ☐ home I have no social life because of pain

Section 10 – Travelling

- ☐ I can travel anywhere without pain
- ☐ I can travel anywhere but it gives me extra pain
- ☐ Pain is bad but I manage journeys over two hours
- ☐ Pain restricts me to journeys of less than one hour
- ☐ Pain restricts me to short necessary journeys under 30 minutes
- ☐ Pain prevents me from travelling except to receive treatment

.

Reference

1. Fairbank JC, Pynsent PB. The Oswestry Disability Index. Spine 2000 Nov 15;25(22):2940-52; discussion 52

APPENDIX 6a: Participant Questionnaire (inserted into Google forms as open- and closed-ended questions)

Socio-demographic information

1. Age
2. Gender
3. Position (permanent/temporary?)
4. Number of years working as call centre agent
5. Number of years working at company
6. Where did you work before starting in the call centre?

Pre-intervention questions

1. How many hours a day do you sit at work every day?
2. Do you take regular breaks?
3. Describe your current workstation?
4. Is your current workstation comfortable?
5. Do you have any pain currently? Please list all areas of pain
6. In your opinion, are these related to work?
7. Did you have any pain when you started this job?
8. Have you used a standing workstation at work for any period before?

Post-intervention questions:

1. Was it easy to use the equipment?
2. How long did it take you to get used to the standing workstation?
3. Did you like using the new standing workstation?
4. Were you comfortable working in a standing position?
5. Were you comfortable going from sitting to standing regularly during the day?

6. How often did you change positions from sitting to standing?
7. If you had pain before, did you still have pain while using the standing workstation?
8. Would you say that the reduction in pain is due to the standing workstation?
9. Do you think your productivity has changed at all while standing? Better / Worse / Same
10. Did changing positions from sitting to standing make any difference to your energy levels at work?
11. Did changing positions from sitting to standing make any difference to your stress levels at work?
12. Did changing positions from sitting to standing make any difference to your job satisfaction?
13. Did using the standing workstation disrupt your work, or that of your colleagues around you in any way? Please explain.
14. Would you recommend having a standing workstation at work?
15. What do you prefer – sitting only, standing only or changing between sitting and standing?
16. If you could make any changes to the standing workstation, what would it be? Please explain.

APPENDIX 6b: Colleague Questionnaire (inserted into Google forms as open- and closed-ended questions)

1. How far from the user do you sit?
2. How well do you know the user as a team member? Very well / Fairly well / Not at all?
3. Did your colleague's new workstation disrupt your routine in any way? Please elaborate
4. Are you aware of any complaints from this user relating to his / her current workstation? Please elaborate
5. Was this process disruptive to you or your team? Please elaborate
6. Would you recommend using standing workstations in the call centre? Please elaborate
7. Have you tried out the workstation yourself? If yes, what did you think of it? Would you like to have one?
8. Did your colleague give you any feedback on his/her experience using the workstation? Please share a few thoughts
9. What did management have to say about it?
10. Would you say it is feasible to use a standing workstation in a call centre?

APPENDIX 6c: Management Questionnaire (inserted into Google forms as open- and closed-ended questions)

1. Are you the direct line of report for this user?
2. How long have you been the user's direct line of report?
3. How well do you know the user as a team member? Very well / Fairly well / Not at all
4. Are you aware of any complaints from this user relating to his / her current workstation? Please elaborate
5. Was this process disruptive to you or your team? Please elaborate
6. In your opinion, is this a feasible and viable option for the call centre environment?
7. How did standing affect the user's productivity?
8. Have you had any complaints from other staff members while the user was testing the standing work station?
9. Please share any further feedback you may have?
10. Would you recommend standing as a viable solution in the call centre?

APPENDIX 7: Daily Timesheet

Time	Monday	Tuesday	Wednesday	Thursday	Friday
09:30					
10:00					
10:30					
11:00					
11:30					
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